

THE GENUS *PSORTHASPIS* (HYMENOPTERA: POMPILIDAE) IN COLOMBIA

El género *Psorthaspis* (Hymenoptera: Pompilidae) en Colombia

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ABSTRACT

The biodiversity of spider wasps in *Psorthaspis* occurring in Colombia was examined in this study. Three species of this genus were found in northern and western Colombia, of which two represent new distributional records: *Psorthaspis variegata* and *Psorthaspis connexa* are recorded from Chocó and Magdalena, respectively. A neotype is established for *Psorthaspis colombiae*. The morphological variation, coupled with geographic distribution, precludes the division of *P. variegata* and *P. connexa* into subspecies. A discussion on the status of these subspecies is provided. A key to the members of the genus in Colombia also is presented.

Key words. Aporini, Colombia, Hymenoptera, Pompilidae, *Psorthaspis*.

RESUMEN

Se estudió el género *Psorthaspis* en Colombia. Se encontraron tres especies distribuidas en el norte y occidente de Colombia, de ellas dos representan nuevos registros de Pompilidae en el país: *Psorthaspis variegata* y *Psorthaspis connexa* que se encuentran en Chocó y Magdalena, respectivamente. Se establece un neotipo para *Psorthaspis colombiae*. La variación morfológica y la distribución de *P. variegata* y *P. connexa* hacen necesario evitar el uso de unidades subespecíficas. Se ofrece una discusión del estado de estas subespecies. Se presenta una clave para los miembros de *Psorthaspis* en Colombia.

Palabras clave. Aporini, avispa cazadora de arañas, Hymenoptera, Pompilidae, taxonomía.

INTRODUCTION

Spider wasps (Hymenoptera: Pompilidae) are a widespread group of about 5 000 described species (Pitts *et al.* 2006) in approximately 120 genera (Wasbauer 1996). Pompilids are solitary wasps that mostly prey on spiders (Goulet & Huber 1993).

These wasps are conspicuous elements in many ecosystems, but only the fauna of North America has been widely studied. Few modern

studies (e.g., Bradley 1944; Evans 1966; Roig-Alsina 1984, 1989; Colomo de Correa 1991, 1992; Snelling & Torres 2004) have focused on Neotropical Pompilidae (Fernández 2006a), but they consist mainly of species descriptions. Fernández (2006b) published the most recent study at the generic level and published a key to the Neotropical genera. Some Neotropical tribes such as Aporini and Pompilini have been studied in depth for Central America (Evans 1966), leaving the South American species particularly in need

of revision. New collection material, and the revision of South American taxa represented in existing collections will help to clarify the classification of these tribes.

Psorthaspis Banks, 1912 is one of the most interesting genera with respect to American biogeography. These wasps are distributed from the northeastern United States to northern South America, including the Antilles. The genus contains 28 valid species (Bradley 1944; Evans 1966) and is easily identified by the characteristic long pronotum and rounded clypeus. At present, only one species, *Psorthaspis colombiae* Bradley, 1944, which was collected in the northern Sierra Nevada de Santa Marta of Colombia, has been reported for South America (Bradley 1944).

Here we present two new records for *Psorthaspis* in Colombia. New female specimens studied at Instituto Alexander von Humboldt insect collection revealed the presence of two species that previously had been recorded only for Central America: *Psorthaspis variegata* (Smith, 1862) and *Psorthaspis connexa* (Cresson, 1869). In addition, we provide a diagnosis of the *Psorthaspis* species of Colombia, offer comments on their taxonomy, and provide a taxonomic key to the Colombian species. Our study also uncovered specimens with intermediate characters between the subspecies of *Psorthaspis variegata* and those of *Psorthaspis connexa* and necessitate a reevaluation of the validity of these subspecies. Finally, we establish a neotype for *Psorthaspis colombiae* Bradley, 1944.

Male specimens found at the Instituto Alexander von Humboldt insect collection could provide more information for the group, but unfortunately the loan for this material was denied to Utah State University. The present publication was based on high definition photographs of the females.

MATERIALS AND METHODS

Specimens were studied from the Academy of Natural Sciences Philadelphia – Entomology, Philadelphia, PA, USA (ANSP); Cornell University Insect Collection (CUIC), Ithaca, NY, US; Essig Museum of Entomology (EMEC), Berkeley, CA, US; Harvard University Museum of Comparative Zoology – Entomology, Cambridge, MA, US (MCZC), Colección de Artrópodos, Instituto Alexander von Humboldt, Villa de Leyva, Colombia (IAvH), Marius Wasbauer Personal Collection, Brookings, OR, US (MWPC), National Museum of Natural History – Entomology, Washington, D. C., US (NMNH) and Utah State University Entomology Collection, Logan, UT, US (EMUS). In total, 57 pinned individuals of *Psorthaspis* of three species were found from Colombia. Each specimen was checked against published diagnoses (Bradley 1944; Evans 1966).

Morphological analysis and dissections were done using a Leica MZ7.5 stereomicroscope. Several morphological characters used in the classification of *Psorthaspis* were examined, such as: pubescence, tomentum, body color, head morphology and male genital morphology. Genitalia were dissected, cleared in KOH solution and stored in glycerin.

Morphological terminology used here follows that of Bradley (1944) and Evans (1966). Male genital terms are illustrated in Figure 1 and follow Evans (1966). Morphological characters employed are defined as follows: SGP (subgenital plate of male, apical sternite) and tomentum (short, dense, fine pubescence).

Line drawings of male genitalia were traced by hand from high-definition images taken using a ProgRes C10 camera mounted on a Leica MZ75 stereomicroscope. The images were refined using a camera lucida mounted on a Wild M-5 stereomicroscope and a Wild M-11 light microscope. These illustrations

were then inked and scanned at 1000dpi to be cleaned in Adobe Photoshop.

RESULTS AND DISCUSSION

Key to species of *Psorthaspis* from Colombia

Females (Modified from Bradley 1944 and Evans 1966)

1. a. Integument entirely black; pubescence and tomentum bluish or purplish covering all the body; wings dark
..... *Psorthaspis colombiae* Bradley
- b. Integument with yellow or white bands or spots on abdomen dorsum; tomentum orange on pronotum, pubescence black or grey elsewhere; wings banded 2
2. a. T2 and T4 with pale markings; mesoscutum glabrous
..... *Psorthaspis connexa* (Cresson)
- b. T3 with pale markings; mesoscutum with orange pubescence
..... *Psorthaspis variegata* (Smith)

Males (Modified from Evans 1966; male unknown for *Psorthaspis colombiae*)

1. a. SGP continuously round apically (Fig. 1a); digitus with long setae on the dorsal apex; aedeagus bilobed (Fig. 1b)
..... *Psorthaspis connexa* (Cresson)
- b. SGP angulate laterally (Fig. 1c); digitus with short setae on the dorsal apex; aedeagus continuously round apically (Fig. 1d)
..... *Psorthaspis variegata* (Smith)

Species diagnoses and comments

Psorthaspis colombiae Bradley

Psorthaspis colombiae Bradley, 1944, Amer. Ent. Soc. Trans. 70: 47-48. [Neotype: female, San Lorenzo Mts., Partidas Cincinnati, Magdalena, Colombia; January 1, 1923 (M. A. Carriker) (MCZC)].

Female diagnosis: The females of this species can be recognized by the presence of a semi-

circular ridge extending from one lower corner to the other on the hind face of the propodeum. Other useful characters include the presence of bluish to purplish tomentum covering the whole body except for antennal fossae, which have silvery tomentum, rugose sculpturing on the propodeal flanges and dark wings with a dull purplish sheen.

Male: Unknown.

Comments: This species was described based on a single specimen from Colombia. The holotype, according to Bradley (1944), should be deposited in the Museum of Comparative Zoology, Harvard University (MCZC). At present, there is no specimen labeled as the holotype of *P. colombiae* in MCZC or any of the collections where Bradley may have deposited his specimens (ANSP, CUIC). However, there is a specimen in the MCZC from the type locality that matches all the characters indicated in Bradley's description of *P. colombiae*. This specimen could be the holotype of *P. colombiae* but bears a Bradley manuscript name. We also found two specimens at ZMUC that match Bradley's description of *P. colombiae*, and whose only collection data read "Columbia" and "Guyana".

Given that there are several closely related *Psorthaspis* species that are difficult to separate morphologically, and that a type specimen would provide taxonomic stability to the group, we propose the necessity of designating a type for *P. colombiae*. To solve this issue, the first option would be to designate a neotype from any of the two specimens available at ZMUC. Second, we could assume that the specimen with manuscript name found in MCZC is the holotype and that Bradley labeled it incorrectly. In that case, we would not have to designate a neotype. Lastly, we could designate the manuscript named specimen in MCZC as a neotype. Designating a neotype with vague collection data is not recommendable; therefore we should

discard the first option. The second option is not possible because we have no evidence to support it. Consequently we establish the manuscript named specimen as the neotype for *P. colombiae*.

Distribution: northern Colombia and Guyana

Material examined: COLOMBIA.

Magdalena: 1♀, San Lorenzo Mts., Partidas Cincinnati, January 1, 1923, *M.A. Carriker*, neotype by present designation MCZC. COLOMBIA, 1♀ (no further data), ZMUC. GUYANA, 1♀ (no further data) ZMUC.

***Psorthaspis connexa* (Cresson)**

Pompilus connexus Cresson, 1869, Proc. Boston Soc. Nat. Hist., 12: 369-370 [Holotype: male, Mexico: Veracruz: Orizaba (F. Sumichrast) (ANSP, no. 560)].-Cameron, 1893, Biol. Centr.-Amer., Hymen. II, p. 201.

Pompilus bugabensis Cameron, 1893, Biol. Centr.-Amer., Hymen. II, p. 188 [Type: female, Panama: Bugaba, 800-1500 feet (GCC) (BMNH, no. 19, 315)]. **New synonymy.**

Pedinaspis bugabensis: Schulz, 1911, Zool. Annalen, 4: 119.

Psorthaspis bioculata Bradley, 1944, Trans. Amer. Ent. Soc., 70: 70-71 [Type: female, Costa Rica (no further data) (NMNH, no. 57, 930)]. Synonymized by Evans, 1966: 116.

Psorthaspis bugabensis: Bradley, 1944, Trans. Amer. Ent. Soc., 70: 72.

Dicyrtomalis connexa: Bradley, 1944, Notulae Nat., Acad. Nat. Sci. Phila., no. 145, p.11.

Psorthaspis connexa bugabensis: Evans, 1966, Mem. Amer. Ent. Soc., 20: 117-119.

Psorthaspis connexa connexa: Evans, 1966, Mem. Amer. Ent. Soc., 20: 115-117.

Female diagnosis: The females of *P. connexa* can be recognized by the ivory white markings on T2 and T4. Other important

characters are the presence of appressed orange tomentum located on the pronotum, the narrow frontal bridge of the clypeus, and the banded wings.

Male diagnosis: The males are recognized by the morphology of the SGP, which is the same width through all its length, lacks angulations and is rounded apically (Fig. 1a). Also the aedeagus is bilobed and the digitus is slender at the base and wide at the apex. Lastly, the tips of the digiti have long setae except for the apical ventral area (Fig. 1b).

Comments: This species was previously divided into two subspecies, *P. connexa connexa* and *P. connexa bugabensis*. The status of *P. c. bugabensis* was questioned by Evans (1966) due to lack of material revised. Here we provide further evidence rejecting the legitimacy of these names. Females of the subspecies were distinguished by the presence or absence of banding in the T5 and the absence of orange pubescence on the lateral sides of the pronotum. Specimens have been found from Costa Rica that have a lighter area on this segment, which could be an intermediate form between the banded and unbanded specimens. In addition, a specimen from Mexico lacks pubescence on the side of the propodeum similar to *P. connexa bugabensis*, but has the band in T5 like *P. connexa connexa*. The genitalia of *P. connexa connexa* males were not included in the species description; Evans (1966) proposed that, perhaps, this is identical to *P. connexa bugabensis*. The material studied throughout the range of the species corroborates this suggestion. Thus, we conclude that these two subspecies are synonymous.

Distribution: Western Mexico to Western Colombia.

Material examined: COLOMBIA. **Choco:** 1♀, PNN Utria, Boroboro, 6°1'N 77°20'W, 10m, Malaise, 19-27. vii. 2000. *J. Perez,*

IAvH no. 108277. COLOMBIA. **Valle:** 1♀ PNN Farallones de Cali, Anchicaya, 3°26'N 76°48'W, 1000 m, Malaise, 17-31. vi. 01, *S. Sarria*, IAvH no. 108279. MEXICO. **Jalisco:** 2♀, Careyes, 12 Feb-19 Mar 1997, *F. D. Parker*, EMUS. MEXICO. **Veracruz:** 1♀2♂, Cloud Forest 3 mi N Santiago-Tuxtla, VII-18-61, *D. H. Janzen*, EMEC. COSTA RICA. **Guanacaste:** 7♀2♂, Finca Montezuma, 3km SE RioNaranjo, 17-24 Jun 92, *F. Parker*,

EMUS. PANAMA. **Panama:** 1♀ Canal Zone. Madden Forest Pres. 18 Feb, 1959, *W. J. Hanson*, EMUS. PANAMA. **Panama:** 1♀ Barro Colorado Is, iv-27-1975, *M. L. Siri*, MWPC. PANAMA. **Panama:** 1♀ Canal Zone, Panama. Barro Colorado I, VIII-28-1977, *R. B. & S. L. Kimsey*, MWPC. MEXICO. **Veracruz:** 1♂ Orizaba, *F. Sumichrast*, holotype of *Pompilus connexus* Cresson ANSP, no. 560.

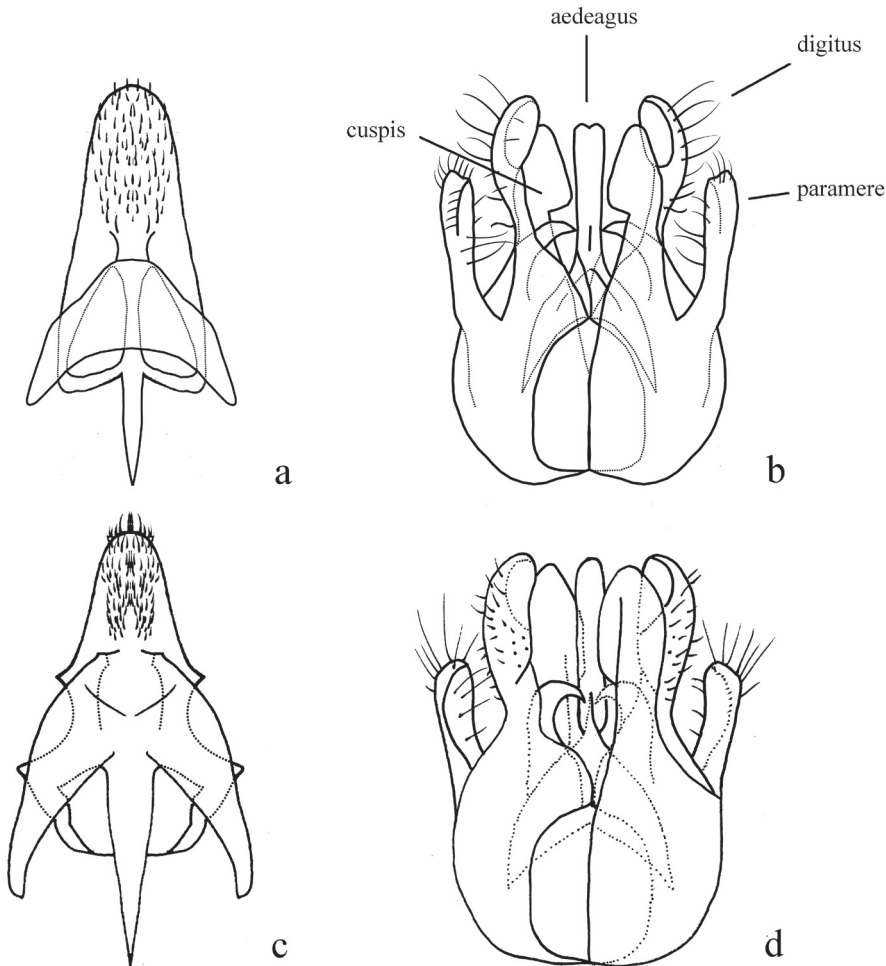


Figure 1. *Psorthaspis connexa* male subgenital plate (a), *Psorthaspis connexa* male genitalia (ventral view left and dorsal view right) (b), *Psorthaspis variegata* male subgenital plate (c), *Psorthaspis variegata* male genitalia (ventral view left and dorsal view right) (d). Scale = 0.25 mm.

***Psorthaspis variegata* (Smith)**

Ferreola variegata Smith, 1862, Jour. Ent., 1: 389:399 [Holotype: female, Mexico (BMNH, no. 19, 311).

Pompilus confusaneus Cresson, 1869, Proc. Boston Soc. Nat. Hist., 12: 369 [Type: male, Mexico: Veracruz: Orizaba (F. Sumichrast) (ANSP, no. 559)]. – Cameron, 1893. Biol. Centr.-Amer., Hymen. II, p. 201. Synonymized by Evans, 1966: 112.

Ferreola formosa: Cresson, 1869, *ibid.*, p. 376 (Orizaba, Mexico; misidentification).

Pompilus pictus Kohl, 1886, Verh. K. K. Zool.-Bot. Ges. Wien, 36: 338 [Type: female, Mexico: Morelos: Cuernavaca (Bilimek) (?Viena Mus.)]. – Cameron, 1893, *op. cit.*, p. 188. Synonymized by Evans, 1966: 112.

Pompilus variegatus: Cameron, 1893, *ibid.*, p. 188.

Pompilus impudicus Cameron, 1893, Biol. Centr.-Amer., Hymen. II, p. 187 [Type: female, Panama: Peña Blanca, 3-4000 feet (GCC) (BMNH, no. 19, 314)]. **New synonym**

Pedinaspis picta: Schulz, 1911, Zool. Annalen, 4: 120.

Pedinaspis impudica: Schulz, 1911, Zool. Annalen, 4: 119.

Psorthaspis canipennis Bradley, 1944, Trans. Amer. Ent. Soc., 70: 71-72 [Type: female, Panama: Alajuela, 28 May 1912 (A. Busck) (NMNH, no. 57, 931)]. **New synonym.**

Psorthaspis picta: Bradley, 1944, Trans. Amer. Ent. Soc., 70: 68-69 (redescribed).

Dicyrtomalis confusanea: Bradley, 1944, Notulae Nat., Acad. Nat. Sci. Phila., no. 145, p. 11.

Psorthaspis variegata variegata: Evans, 1966, Mem. Amer. Ent. Soc., 20: 112-115.

Psorthaspis variegata impudica: Evans, 1966, Mem. Amer. Ent. Soc., 20: 115.

Female diagnosis: Females of this species can be recognized by the presence of yellow markings on T3 and sometimes T4. In addition, the pronotum has appressed orange

tomentum, although sometimes the anterior and/or lateral parts are devoid of it. The frontal bridge of the clypeus is narrow, while the wings are banded.

Male diagnosis: The males of this species are recognized by the morphology of the SGP, which is strongly keeled, and the keel arched in profile when flattened (Fig. 1c). In addition, the aedeagus is continuously rounded apically and the digiti are wide through all their length. The tips of the digiti have short setae except for the apical ventral area (Fig. 1d).

Comments: This species also was divided in two subspecies by Evans (1966). The nominate subspecies is diagnosed by the presence of an orange band on T3 and lacking orange pubescence in the anterior part of the pronotum. This subspecies occurs from Southern Mexico to El Salvador. *P. variegata impudica*, was distinguished by the presence of spots on T3 and the presence of pubescence on the anterior pronotum. This subspecies is recorded from Panama. Specimens from Costa Rica are intermediate between the two subspecies; they have a band on T3 and the anterior pronotum entirely covered with pubescence. Furthermore, two specimens from Colombia have spots on T3 and an incomplete pronotal pubescence. The males of this species are morphologically uniform and cannot be separated into subspecies. As such, we consider that these two subspecies are synonymous.

Distribution: Southern Mexico to northern Colombia (Magdalena).

Material examined: COLOMBIA. **Magdalena:** 1♀, PNN Santa Marta, El Ramo, 10°48'N 73°39'W, 2500m, Malaise 11-25. v. 2000. *I. Uribe*, IAvH. PANAMA: **Alajuela:** 1♀, 28 May 1912, *A. Busck*, *Psorthaspis canipennis* Bradley holotype, NMNH, no. 57, 931. MEXICO. **Veracruz:** 1♂, Orizaba, *F. Sumichrast*, *Pompilus*

confusaneus Cresson holotype, ANSP, no. 559. COSTA RICA. **Guanacaste**: 18♀ 10♂, Finca Montezuma, 3KM SE Rio Naranjo, 25. ii. 92-2.iii.92, *F. Parker*, EMUS. EL SALVADOR: **San Salvador** 1♀, 4000-6400m, vii. 8. 1998, *D. O. Cavagnaro & M. E. Irwin*, CAS. PANAMA: **Panama** 1♀, Bayano, 35 km E. Canitas, 11. v. 1985, *A. J. Gilbert, P. H. Sullivan & F. T. Hovore*, MWPC. EL SALVADOR: 1♂ Quetzaltepeque 1986, CAS.

ACKNOWLEDGEMENTS

We thank the curators of all the institutions who loaned material to our laboratory, Marius Wasbauer for providing material for this study, Claudia Medina from Instituto Alexander von Humboldt for the facilitation of our visit to IavH, Victor Gonzalez for critically reviewing the article and NSF for funding.

LITERATURE CITED

BRADLEY, J.C. 1944. A preliminary revision of the Pompilinae (exclusive of the tribe Pompilini) of the Americas. Transactions of the American Entomological Society 70: 23–157.

COLOMO DE CORREA, M.V. 1991. Contribución al conocimiento de los Pompilinae argentinos (Hymenoptera: Pompilidae). III. *Poecilopompilus victori* sp. N. Acta Zoológica Lilloana 49: 53-57.

COLOMO DE CORREA, M.V. 1992. Contribución al conocimiento de los Pompilinae argentinos (Hymenoptera: Pompilidae). IV. Observaciones sobre algunas especies de *Poecilopompilus* Howard. Revista de la Sociedad Entomológica Argentina 51: 53-61.

EVANS, H. 1966. A revision of the Mexican and Central American spider wasps of the subfamily Pompilinae (Hymenoptera: Pompilidae). Memoirs of the American Entomological Society 20:1–442.

FERNÁNDEZ, F. 2006a. Avispas cazadoras de arañas (Hymenoptera: Pompilidae) de la región neotropical. Biota Colombiana 1:3-24.

FERNÁNDEZ, F. 2006b. Familia Pompilidae. Págs. 563-575 en: FERNÁNDEZ, F. AND M. J. SHARKEY. 2006. *Introducción a los Hymenoptera de la región neotropical*. Sociedad Colombiana de Entomología y Universidad Nacional de Colombia, Bogotá D.C.

GOULET, H. & J.T. HUBER. 1993. *Hymenoptera of the world: an identification guide to families*. Agriculture Canada Research Branch, Ottawa.

PITTS, J.P., M.S. WASBAUER & C.D. VON DOHLEN. 2006. Preliminary morphological analysis of relationships between the spider wasp subfamilies (Hymenoptera: Pompilidae): revisiting an old problem. Zoologica Scripta 35: 63-84.

ROIG-ALSINA, A. 1984. Contribución al conocimiento de los Pepsinae sudamericanos. El género *Chirodamus* Haliday (Hymenoptera, Pompilidae). Physis Sección C 42: 109–120.

ROIG-ALSINA, A. 1989. La posición sistemática de los grupos hasta ahora incluidos en *Chirodamus* Haliday *sensu lato* y revisión de *Pompilocalus* gen. nov. (Hymenoptera Pompilidae). Revista de la Sociedad Entomológica de Argentina 43: 165–170.

SNELLING, R.R. & J.A. TORRES. 2004. The spider wasps of Puerto Rico and the British Virgin Islands (Hymenoptera: Pompilidae). Journal of the Kansas Entomological Society 77: 356-376.

WASBAUER, M.S. 1996. Pompilidae p 522-539 En: Hanson, P. E. and I. D. Gauld (eds.). *Hymenoptera of Costa Rica*. Oxford University Press, Oxford.

Recibido: 04/03/2010

Aceptado: 13/09/2010

